Overview of the Evolution of EN1994: Design of Composite Steel and Concrete Structures

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Structure of this slide deck

→ General overview of the evolution of EN 1994

→ Specific overview of the evolution of EN 1994 parts:
  ▪  Part 1-1: General Rules and Rules for Buildings
  ▪  Part 1-2: General Rules – Structural Fire Design
  ▪  Part 2: General Rules and Rules for Bridges
General overview of the Evolution of EN1994: Design of Composite Steel and Concrete Structures

Date June 2020
Agenda – Evolution of EN 1994

→ Key changes to EN 1994
→ New content included in the scope of EN 1994
→ How ease of use has been enhanced

The following slides provide a general overview of the evolution of EN 1994. Complementary slides provide greater details for individual Eurocode Parts.
Key changes to EN 1994

- Correction of errors identified by users during Systematic Review
- Clarifications requested by users
- Extensions of scope requested by users, and updates to reflect current practice
- Improved alignment between parts and with other Eurocodes
- Reduction in possibilities for national variations (NDPs)
New content included in scope of EN 1994

→ Rules for shallow floor construction
→ Rules for beams with large web openings
→ Improved fire design using so-called Tensile Membrane Action
→ Explicit signage to allow use of advanced methods

→ We will also produce two CEN Technical Specifications covering;
  ▪ Twin-skin composite construction
  ▪ Composite dowel shear connection for bridges
How ease of use has been enhanced

- **Better alignment between Parts and with other Eurocodes**
  - Technical provisions
  - Layout and structure
  - Wording

- **For technical provisions the hierarchy for ‘harmonisation’ is to:**
  - Provide rules that agree with other Eurocodes
  - Explain why rules that one might imagine should be the same are different (so users appreciate differences are not just a mistake)

- **Generally we are trying to avoid changing current, familiar rules unless there is a clear need**
Overview of the Evolution of EN1994-1-1: General Rules and Rules for Buildings

Date June 2020

- Key changes to EN 1994-1-1
- New content included in the scope of EN 1994-1-1
- How ease of use has been enhanced
Key changes to EN 1994-1-1

- **Correction of errors identified by users**
  - Feedback from Systematic Review

- **Clarification of clauses identified by users as unclear**
  - Feedback from Systematic Review

- **Modification of shear connection rules to reflect modern forms of composite decking**
  - Previous rules were empirical, based on products in the market <1990

- **Inclusion of rules to extend scope (as requested by users)**
  - Beams with large web openings
  - Shallow floor construction
New content included in scope of EN 1994-1-1

→ Rules for shallow floor construction

“composite” solutions in combination with solid concrete, semi pre-cast elements or ribbed metal sheets

New content included in scope of EN 1994-1-1

→ Rules for beams with large web openings
How ease of use has been enhanced

→ Better alignment between Parts and with other Eurocodes
  ▪ Technical provisions
  ▪ Layout and structure
  ▪ Wording

→ For technical provisions our hierarchy is to:
  ▪ Provide rules that agree with other Eurocodes
  ▪ Explain why rules that one might imagine should be the same are different (so users appreciate differences are not just a mistake)

Date June 2020

➞ Key changes to EN 1994-1-2

➞ New content included in the scope of EN 1994-1-2

➞ How ease of use has been enhanced
Key changes to EN 1994-1-2

→ Correction of errors identified by users
  - Feedback from Systematic Review

→ Clarification of clauses identified by users as unclear
  - Feedback from Systematic Review

→ New Annex covering concrete filled hollow sections
  - Previous Informative Annex was widely disallowed.
  - New annex is based on extensive new research

→ Provision of rules for Tensile Membrane Action
Rules for so-called Tensile Membrane Action added

- Such action reduces the requirement for fire protection of some beams
- Different methods have been used by practitioners (in some countries) for over a decade
- One such method is given in detail in an Informative Annex
How ease of use has been enhanced

→ Better alignment between Parts and with other Eurocodes
  - Technical provisions
  - Layout and structure
  - Wording

→ For technical provisions our hierarchy is to:
  - Provide rules that agree with other Eurocodes
  - Explain why rules that one might imagine should be the same are different (so users appreciate differences are not just a mistake)

→ The new annex on composite column design went through several iterations to make it less ‘academic’ and more ‘user friendly’
Overview of the Evolution of EN1994-2: General Rules and Rules for Bridges

Date June 2020

→ Key changes to EN 1994-2
→ New content included in the scope of EN 1994-2
→ How ease of use has been enhanced
Key changes to EN 1994-2

→ Correction of errors identified by users
  ▪ Feedback from Systematic Review

→ Clarification of clauses identified by users as unclear
  ▪ Feedback from Systematic Review

→ Format has been modified to better align with other Eurocodes
  ▪ Previous format reproduced all general rules to provide one self-contained document and reduce crossReferencing
New content included in scope of EN 1994-2

→ *Rules for composite dowel shear connectors*

- A draft annex was prepared, but it has now been decided to place this content into a CEN Technical Specification
- The annex is based on existing practice for bridges, and will therefore be widely used
- The decision to place it (initially) in a TS is so that it can be expended to cover buildings and included in the next version of EN1994
How ease of use has been enhanced

→ Better alignment between Parts and with other Eurocodes
  ▪ Technical provisions
  ▪ Layout and structure
  ▪ Wording

→ For technical provisions our hierarchy is to:
  ▪ Provide rules that agree with other Eurocodes
  ▪ Explain why rules that one might imagine should be the same are different (so users appreciate differences are not just a mistake)

→ Extensive restructuring of the document